

APPLICATION OF CLIMATE INDICATORS TO US CHILD POPULATION: TRENDS IN TEMPERATURE VARIABILITY

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Background and Aims: Children may be particularly susceptible to climatic change, including extreme temperature. Childhood exposure and health effects of recent temperature extremes remain largely unknown. We highlight the development and initial evaluation of multiple climate indicators and their evaluation through linkage to child population counts to identify childhood exposure trends.

Methods: County-level daily maximum and minimum temperature records from ~8,000 national weather stations (National Climatic Data Center) were geospatially and temporally-linked to US Census annual child population estimates (ages 0-17 years) for 2,311 US counties (~xx% of children). Indicators were developed by: (1) Defining a reference period, 1977-1987; (2) calculating 99th and 1st percentile thresholds of MAX and MIN temperature values for each month/county over the 11-year period; and (3) tabulating the days which exceeded hot and cold thresholds for our study period (1988-2008). Trends in childhood exposure to extreme temperature were stratified by month, season, year, and region.

Results: Days exceeding the 99th percentile hot threshold varied greatly by month, decade, and region, with January experiencing the greatest increase in extreme heat days by decade and region (excluding Western US). Median number of days exceeding the 1st percentile cold threshold dramatically decreased by 85% from the 1980s to 2000s, even when stratified by season and region. There was a 26% increase in percentage of children from 1988-2008 exposed to heat exceeding the 99th percentile of reference period, and a decreased percentage of children exposed to unusually cold days.

Conclusions: Since 1988, US children have been exposed to an increasing number of unusually hot days. Implications for short and long-term child health effects remain to be investigated. Application of climate indicators to national health databases (e.g. National Health Interview Survey) will further investigate children's health implications of extreme temperature.